



## GUEST EDITORIAL

Mark Friedman

### If You Eat Seafood, You're Probably Eating Plastic

Researchers announced recently that regular seafood eaters could be ingesting up to 11,000 microplastic particles a year. Even though 99 percent pass through the body, as much as 1 percent, or about 60 particles, may be absorbed and will accumulate over time. In the ocean, plastic acts like a sponge picking up toxins and chemicals. Annually, almost 9 million tons of plastic gets dumped into the ocean, threatening the existence of marine life and potentially tainting the human food supply. The plastic that makes its way into the world's oceans comes from a diverse range of sources, including most clothing made from synthetic materials.

Surprisingly, when such clothes are washed they shed thousands of tiny plastic microfibers. These microplastics are ingested by marine organisms, which we eat, in turn. In addition, the sun's ultraviolet rays break down plastic polymers into chemicals that can disrupt human hormonal systems, especially those of adolescents and pregnant women. Increasing evidence, described in scientific articles, points to the negative impact of these plastics on marine organisms and humans. One such chemical component of plastics is Bisphenol-A (BPA). BPA is used in polycarbonate (i.e., hard) plastic products like water bottles, medical equipment, toys, consumer electronics, household appliances, and automobiles. Epoxy resins containing BPA are used as liners for many food and beverage cans and, surprisingly, in the very common thermal cash register receipts. Certainly, we should be concerned about these facts from environmental and health perspectives, but this situation does provide biology teachers many opportunities to help students engage in real-world science that matters!

We are pleased to report a new collaborative effort between NABT BioClub high school students in Los Angeles and Wakasa High School marine science students in Japan, who are working together to add to the research and demonstrate science in action as they establish an international partnership. This school-to-school collaboration began in January of 2017 and already has students in each country selecting particular waterways such as harbors, oceans, and beaches, as sites for the investigation of the quantities and types of microplastics.

Japanese Marine biology teacher Yasuyuki Kosaka initiated this collaboration with the Animo High School Marine Biology Club and this author and club mentor. Kosaka came to the recent National Science Teachers Association convention in Los Angeles to present students' research data at several workshops. Japanese students found microplastics particles in the stomachs of oysters from the

Sea of Japan—a seafood source, for both aquaculture and fishing, that supplies the city of Kyoto.

The Los Angeles Microplastics Team from the Animo HS Marine Biology Club collected water and sand samples from Alamitos Bay and from beaches at Dockweiler, Cabrillo, and Redondo Beach, and found tens of thousands of plastic nodules, macro and micro plastic debris, and a substantial amount of microplastics and filaments. Microplastics Team captain Diana Cervantes said she took with her valuable experiences from the collaboration. "I have learned to be a better communicator and team player," Cervantes said. "Thanks to this overseas collaboration I've also learned how to communicate with different people and how to properly get my messages across."

Teammate Jessica Gonzalez from Animo HS had a similar experience. "We realized that there is little awareness in our community of plastic pollution," Gonzales said. "We collected samples of microplastics at nearby beaches to show that microplastic pollution is a problem that directly affects marine organisms and humans. That initial passion to create awareness allowed us to present our research at science fairs, to spark individuals from our community to make changes in their lives that will end the growth of microplastic pollution."

Mikinori Matsui from Japan's Wakasa HS said, "Through study of microplastics I learned not only the seriousness of plastic pollution but also the importance of cooperation. We must collaborate with those in other countries to solve this global problem. Now we collaborate with Los Angeles students. Our research has become very exciting; we want to continue to work toward solutions to this problem with them."

The students have presented their findings at local, regional, and international science fairs while organizing to have their prescriptions for solving the microplastics problem spread as far as possible. As solutions, the team suggests that we reduce food packaging, recycle existing plastic, use paper, bamboo, and cornstarch as biodegradable substitutes for plastic, insist that corporations pay for the clean-up costs caused by their businesses, and increase advocacy for more stringent environmental regulations while encouraging innovation and job creation.

The Microplastics Team at Animo HS is working to organize other environmental club students and allies throughout the school district to join the fight against plastic pollution. The students have teamed up with the LA Maritime Institute to conduct research from

the tall ships that often put into multiple ports here in southern California.

The team is also collaborating with like-minded nonprofit organizations such as Algalita, Plastic Ocean, Heal the Bay, 5Gyres, Cabrillo Aquarium, Sea-Lab, Aquarium of the Pacific, and AltaSea, among others. One Saturday each month the team leads tall ship passengers on a hands-on research and data collection expedition thanks to an Explore the Coast grant from the California State Coastal Conservancy, which targeted the often-overlooked Spanish speaking community in environmental education.

So where do we go from here? I appeal to you as fellow educators to consider similar projects with students in your schools, perhaps by forming an NABT BioClub! Also, we want to expand national collaboration with HS students and mount an aggressive

campaign to reduce plastic pollution in rivers, ocean, harbors, beaches, and landfills. Please contact me for more information and to talk about possible joint projects and data sharing.

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MARK FRIEDMAN is mentor to the Microplastics Team. Teachers and student environmental clubs interested in collaborating on Microplastic research and educational action campaigns should contact him at: [Marklewisfriedman@gmail.com](mailto:Marklewisfriedman@gmail.com). The author is a Marine Biology Educator for the Los Angeles Maritime Institute, San Pedro, CA and a Mentor to the Animo, CA High School NABT Bio Club.

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